

REMARKS

Claims 1, 6-12 and 42 are pending in this application.

Claims 2-5 and 13-41 are withdrawn from consideration and claims 1, 6-12, and 42 are rejected.

By this paper, claims 1, 6, and 7 are amended. Support for the amendment of claim 1 may be found in the specification at page 11, lines 23-24 and 29-31, and at page 12, lines 9-27, and in the drawings at FIG. 3a. Support for the amendment of claim 6 may be found in the specification at page 12, lines 17-27. Support for the amendment of claim 7 may be found in the specification at page 11, lines 25-26.

Claim Rejections – 35 U.S.C. § 102(b)

Claim 1 - Furlani et al.

Claims 1 and 42 are rejected under 35 USC 102(e) as being anticipated by the Furlani et al. ('302) reference.

Claim 1 is amended as follows:

1. (currently amended) A printhead comprising:
a fluid chamber having an orifice;
a fluid drop forming mechanism associated with the fluid chamber and being operable to apply to fluid present in the fluid chamber drop forming energy which is sufficient to cause a fluid drop to be ejected from the orifice; and
a fluid drop steering device associated with the fluid chamber and being operable when fluid is within the fluid chamber to be able to apply to fluid inside of the fluid chamber fluid perturbing energy which is insufficient to cause drop formation to fluid present in the fluid chamber and which provides local perturbation of such fluid that changes the velocity of fluid flow during drop ejection to alter a drop path of the fluid drop from the orifice to an angle away from normal to the orifice, the fluid drop steering device being distinct from the fluid drop forming mechanism.

Amended claim 1 is patentable over Furlani et al. because the reference does not disclose the claimed features (1) of applying a fluid perturbing energy to the fluid in a fluid channel and (2) for the fluid perturbing energy to provide a local perturbation of the fluid in the fluid chamber that changes the velocity of fluid

**flow during drop ejection from an orifice in order to change the direction of
fluid flow from the orifice.**

The Examiner in the rejection of claim 1 as being anticipated by Furlani et al. indicates that the claimed "fluid drop forming mechanism" is the heater annulus 68 surrounding the orifice 18 and the claimed "fluid drop steering mechanism" is the bimorph flexible elements 54 and 64 in Furlani et al. When selectively heated, the bimorph flexible element 54 or 64 bends as shown in FIGS. 5 and 6 respectively to restrict ink flow in the first or second ink delivery channel 50 or 60 (so that the ink flow through one channel is less than the ink flow through the other channel). This changes the direction of ink flow to the left or the right in FIGS. 5 and 6 from the orifice 42 by tilting the ink jet 44 as shown. See [0035] and [0036] in Furlani et al.

In non-obvious contrast, amended claim 1 calls (1) for applying a fluid perturbing energy to the fluid in a fluid chamber and (2) for the fluid perturbing energy to provide local perturbation of the fluid in the fluid chamber that changes the velocity of fluid flow during drop ejection in order to tilt the direction of fluid flow from the orifice. This approach is totally different than the one disclosed in Furlani et al. In Furlani et al., there is no application of a fluid perturbing energy to the ink in the first and second ink delivery channels 50 and 60, nor is there a velocity change of ink flow during drop ejection from the orifice 42 in order to tilt the direction of ink flow from the orifice. The bimorph flexible elements 54 and 64 simply act to restrict ink flow in the first or second ink delivery channel 50 or 60 (so that the ink flow through one channel is less than the ink flow through the other channel); they do not apply a fluid perturbing energy that provides a velocity change of ink flow during drop ejection from the orifice 42. .

Accordingly, amended claim 1 is patentable over Furlani et al.

Claim Rejections – 35 U.S.C. § 103

Claim 1 - Hawkins et al.

Claims 1 and 42 are rejected under 35 USC 103(a) as being unpatentable over the Hawkins et al. ('435) reference.

Amended claim 1 is patentable over Hawkins et al. because the reference does not disclose the claimed features (1) of applying a fluid perturbing energy to the fluid in a fluid chamber and (2) for the fluid perturbing energy to provide a local

perturbance of the fluid in the fluid chamber that changes the velocity of fluid flow during drop ejection from an orifice in order to change the direction of fluid flow from the orifice.

The Examiner in the rejection of claim 1 as being unpatentable over Hawkins et al. indicates that the claimed "fluid drop forming mechanism" is not disclosed in Hawkins et al. and the claimed "fluid drop steering mechanism" is the protrusion 44 in Hawkins et al.

In Hawkins et al., a plastic substance 40 that fills a non-ink reservoir 28 is heated by a heater 48, causing the plastic substance to expand lengthwise to form the protrusion 44. The protrusion 44 extends into an ink-filled nozzle cavity 32 in order to tilt the direction of ink flow ejected from the orifice 26 to the left as shown in FIG. 3b. See [0041] in Hawkins et al.

In non-obvious contrast, amended claim 1 calls (1) for applying a fluid perturbing energy to the fluid in a fluid chamber and (2) for the fluid perturbing energy to provide local perturbation of the fluid in the fluid chamber that changes the velocity of fluid flow during drop ejection in order to tilt the direction of fluid flow from the orifice. This approach is totally different than the one disclosed in Furlani et al. In Hawkins et al., there is no application of a fluid perturbing energy to the ink in the nozzle cavity 32, nor is there a velocity change of ink flow during drop ejection from the orifice 26. The application of heat to create the protrusion 44 occurs in the reservoir 44 filled with the plastic substance 40; it does not occur in the ink-filled nozzle cavity 32. Moreover, the protrusion 44 simply acts as an ink deflection device at the orifice 26; it does not provide a velocity change of ink flow during drop ejection from the orifice 26.

Accordingly, amended claim 1 is patentable over Hawkins et al.

Claim 6 - Furlani et al. in view of Anagnostopoulos et al.

Claims 6-8 are rejected under 35 USC 103(a) as being unpatentable over the Furlani et al. (302) reference in view of the Anagnostopoulos et al. (595) reference.

Claim 6 is amended as follows:

6. (currently amended) The printhead according to Claim 1, wherein as being anticipated by Furlani et al. indicates that the claimed "fluid drop forming mechanism" is the heater 68 surrounding the orifice 18 and the claimed "fluid drop steering mechanism" is the bimorph flexible elements 54 and

64 in Furlani et al. *** operatively associated with the fluid chamber so that the fluid perturbing energy is heat energy, the heat energy raising fluid temperature to provide a change in fluid viscosity that changes the velocity of fluid flow during drop ejection to alter the drop path of the fluid drop from the orifice to the angle away from normal to the orifice.

Amended claim 6 is patentable over Furlani et al. in view of Anagnostopoulos et al. because Anagnostopoulos et al. when combined with Furlani et al. does not disclose the claimed features (1) of applying a fluid perturbing energy to the fluid in a fluid channel, (2) for the fluid perturbing energy to provide a local perturbation of the fluid in the fluid chamber that changes the velocity of fluid flow during drop ejection from an orifice in order to change the direction of fluid flow from the orifice, and (3) for the fluid perturbing energy to be heat energy that raises fluid temperature to provide a change in fluid viscosity that changes the velocity of fluid flow during drop ejection in order to change the direction of fluid flow from the orifice.

The Examiner in the rejection of claim 6 as being unpatentable over Furlani et al. in view of Anagnostopoulos et al. indicates that the claimed fluid drop steering device/heater is the heater annulus 50 in Anagnostopoulos et al. instead of the bimorph flexible elements 54 and 64 in Furlani et al.

In Anagnostopoulos et al., the heater annulus has two sections, each covering one-half of the nozzle perimeter as shown in FIG. 2A, and the ink stream 60 is deflected by an asymmetric application of heat above the nozzle perimeter by supplying electrical current to one, but not both, of the two heater sections. Thus, Anagnostopoulos et al. fails to disclose the claimed features (1) of applying an ink perturbing energy to the ink in the ink chamber 46, (2) for the ink perturbing energy to provide a local perturbation of the ink in the ink chamber that changes the velocity of ink flow during drop ejection from the orifice in order to change the direction of ink flow from the orifice, and (3) for the ink perturbing energy to be heat energy that raises ink temperature to provide a change in ink viscosity that changes the velocity of ink flow during drop ejection in order to change the direction of ink flow from the orifice.

Accordingly, amended claim 6 is patentable over Furlani et al. in view of Anagnostopoulos et al.

Anagnostopoulos et al. cannot be combined with Furlani et al. to arrive at the claimed invention in claim 6.

The Examiner in the rejection of claim 1 as being anticipated by Furlani et al. indicates that the claimed "fluid drop forming mechanism" is the heater annulus 68 and the claimed "fluid drop steering mechanism" is the bimorph flexible elements 54 and 64 as shown in FIG. 2 of Furlani et al. Under the circumstances, how can she then conclude in the rejection of claim 6 that the claimed "fluid drop forming mechanism" is changed to the heater annulus 50 in Anagnostopoulos et al. instead of being the bimorph flexible elements 54 and 64 in Furlani et al.? Since the heater annulus 68 and the heater annulus 50 would appear to occupy substantially the same space, how can one be "distinct" from the other as in claim 1? Alternatively, if the heater annulus 68 and the heater annulus 50 were placed adjacent one other, the limitations called for in claims 1 and 6 would not be achieved since heat energy from the respective heaters would merge and prevent such claim limitations from occurring.

The Examiner's only rationale for combining Anagnostopoulos et al. with Furlani et al. simply is "in order to produce high quality images at low cost" How is this achieved?

Accordingly, Anagnostopoulos et al. cannot be combined with Furlani et al. to arrive at the claimed invention in claim 6.

Claim 6 - Hawkins et al. in view of Anagnostopoulos et al. (

Claims 6-8 are rejected under 35 USC 103(a) as being unpatentable over the Hawkins et al. ('435) reference in view of the Anagnostopoulos et al. (595) reference.

Amended claim 6 is patentable over Hawkins et al. in view of Anagnostopoulos et al. because Anagnostopoulos et al. when combined with Hawkins et al. does not disclose the claimed features (1) of applying a fluid perturbing energy to the fluid in a fluid channel, (2) for the fluid perturbing energy to provide a local perturbation of the fluid in the fluid chamber that changes the velocity of fluid flow during drop ejection from an orifice in order to change the direction of fluid flow from the orifice, and (3) for the fluid perturbing energy to be heat energy that raises fluid temperature to provide a change in fluid viscosity that changes the velocity of fluid flow during drop ejection in order to change the direction of fluid flow from the orifice.

The Examiner in the rejection of claim 6 as being unpatentable over Hawkins et al. indicates that the claimed that the claimed fluid drop steering device/heater is the heater annulus 50 in Anagnostopoulos et al. instead of the protrusion 44 in Hawkins et al.

In Anagnostopoulos et al., the heater annulus has two sections, each covering one-half of the nozzle perimeter as shown in FIG. 2A, and the ink stream 60 is deflected by an asymmetric application of heat above the nozzle perimeter by supplying electrical current to one, but not both, of the two heater sections. . Thus, Anagnostopoulos et al. fails to disclose the claimed features (1) of applying an ink perturbing energy to the ink in the ink chamber 46, (2) for the ink perturbing energy to provide a local perturbation of the ink in the ink chamber that changes the velocity of ink flow during drop ejection from the orifice in order to change the direction of ink flow from the orifice, and (3) for the ink perturbing energy to be heat energy that raises ink temperature to provide a change in ink viscosity that changes the velocity of ink flow during drop ejection in order to change the direction of ink flow from the orifice.

Accordingly, amended claim 6 is patentable over Hawkins et al. in view of Anagnostopoulos et al.

Anagnostopoulos et al. cannot be combined with Hawkins et al. to arrive at the claimed invention in claim 6.

The Examiner in the rejection of claim 1 as being anticipated by Hawkins et al. indicates that the claimed "fluid drop steering mechanism" is the protrusion 44 shown in FIG. 3b of Hawkins et al. Under the circumstances, how can she then conclude in the rejection of claim 6 that that the claimed "fluid drop forming mechanism" is changed to the heater annulus 50 in Anagnostopoulos et al. instead of being the protrusion 44 in Furlani et al.? Since the heater annulus 50 would appear to occupy substantially the same space as a fluid drop forming heater in Hawkins et al., how can one be "distinct" from the other as in claim 1? Alternatively, if the heater annulus 50 were placed adjacent the fluid drop forming heater other, the limitations called for in claims 1 and 6 would not be achieved since heat energy from the respective heaters would merge and prevent such limitations from occurring.

The Examiner's only rationale for combining Anagnostopoulos et al. with Hawkins et al. simply is "in order to produce high quality images at low cost"
How is this achieved?

Accordingly, Anagnostopoulos et al. cannot be combined with Hawkins et al. to arrive at the claimed invention in claim 6.

Claims 9-12 – Dante et al.

Claims 9-12 are rejected under 35 USC 103(a) as being unpatentable over the Hawkins et al. ('435) reference and the Anagnostopoulos et al. ('595) reference and further in view of the Dante et al. ('547) reference.

Claims 9-12 are rejected under 35 USC 103(a) as being unpatentable over the Furlani et al. ('302) reference and the Anagnostopoulos et al. ('595) reference and further in view of the Dante et al. ('547) reference.

The Examiner has misapplied Dante et al.

In claims 9-12, the heater is the "fluid drop steering device" of claim 1, not the "fluid drop forming device" of claim 1. Conversely, in FIG. 2 of Dante et al., the heater annulus 106 in the orifice 116 is a fluid drop forming device, not a fluid drop steering device. Thus, the Examiner appears to have misapplied Dante et al. in construing the heater annulus 106 in Dante et al. as a fluid steering device.

On the other hand, if the Examiner is relying on Dante et al. to re-position the heater annulus 50 covering the nozzle perimeter as shown in FIG. 2A of Anagnostopoulos et al. to within the orifice 116 as shown in FIG. 2 of Dante et al., it should be appreciated that the heater annulus 50 would lose its ability to serve as an ink drop steering heater.

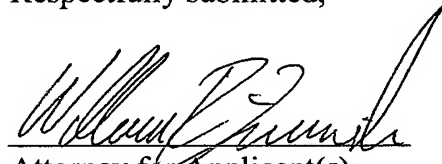
CONCLUSION

The Examiner is requested to call the undersigned Attorney for Applicant(s) in the event that a telephone interview will expedite prosecution of the application towards allowance or reduce the issues for purposes of an appeal. For example, any suggestion of the Examiner regarding amendment to the claims is welcomed.

If the Examiner makes a final rejection of the claims, she is requested to respond to each one of the issues raised above regarding her current (non-final) rejection of the claims. This is necessary for the purposes of further prosecution

and/or appeal. The Examiner indicates that the Applicants' arguments in the earlier '116 Response filed May 27, 2007 "have been considered, but are moot in view of the new ground(s) of rejection". This appears to be incorrect for some of the Applicants' arguments pertaining to Anagnostopoulos et al. and Dante et al. in the earlier "116 Response

Respectfully submitted,


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If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.